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<b>Company:</b> U.S. Patent and Trademark Office	<b>Company:</b> Quallion LLC
	<b>Pages:</b> Total of (14) Pages
<b>Re:</b> Application Serial No.: 10/666,340 Title: Electric Storage Battery Construction and Method of Manufacture Filed September 17, 2003 Examiner: N/A Group Art Unit: 1745 Attorney Docket No.: Q137-US4	<b>Date:</b> March 1, 2004

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Information Disclosure Statement (in duplicate)  
PTO Form 1449 and copy of reference

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**Quallion LLC**

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PATENT  
Docket No.: Q137-US4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:  
TSUKAMOTO, Hisashi et al.

: Examiner: N/A  
: Art Unit: 1745

Serial No.: 10/666,340

Filed: September 17, 2003

For: ELECTRIC STORAGE BATTERY  
CONSTRUCTION AND METHOD  
OF MANUFACTURE

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

This information disclosure statement and Substitute Form 1449 submitted herewith is being filed within three (3) months of the filing date of a national application or before a first action on the merits for the subject application. Also attached is a copy of the International Preliminary Examination Report, dated November 28, 2003, from corresponding PCT Application No. PCT/US03/01338, which is assigned to the Assignee of the present invention.

If it should be determined that for any reason either an insufficient or excessive fee has been paid, please charge any insufficiency or credit any overpayment necessary to ensure consideration of the information disclosure statement for the above-identified application to Deposit Account No. 50-0921. A copy of this paper is enclosed.

Respectfully submitted:

Dated: 3-1-04



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## PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:  
MARY ELIZABETH BUSH  
QUALLION LLC  
P.O. BOX 923127  
SYLMAR, CA 91392-3127

**PCT**

NOTIFICATION OF TRANSMITTAL OF  
INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing  
(day/month/year)

**28 NOV 2003**

Applicant's or agent's file reference

Q137-PCI

**IMPORTANT NOTIFICATION**

International application No.

International filing date (day/month/year)

Priority date (day/month/year)

PCT/US03/01338

15 January 2003 (15.01.2003)

15 January 2002 (15.01.2002)

Applicant

QUALLION LLC

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US

Mail Stop PCT, Attn: IPEA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (703)305-3230

Form PCT/IPEA/416 (July 1992)

Authorized officer

Patrick J. Ryan

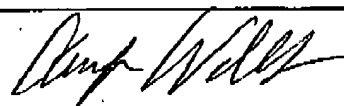
Telephone No. (703) 308-2383

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>Q137-PC1</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/US03/01338</b>	International filing date (day/month/year) <b>15 January 2003 (15.01.2003)</b>	Priority date (day/month/year) <b>15 January 2002 (15.01.2002)</b>
International Patent Classification (IPC) or national classification and IPC <b>IPC(7): H01M 6/10 and US Cl.: 429/94, 29/623.1</b>		
Applicant <b>QUALLION LLC</b>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>5</u> sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input checked="" type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand <b>14 August 2003 (14.08.2003)</b>	Date of completion of this report <b>22 October 2003 (22.10.2003)</b>	
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer Patrick J. Ryan  Telephone No. (703) 308-2383	

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/01338

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed.
- ☒ the description:  
pages 1-13 as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
pages 14-29, as originally filed  
pages NONE, as amended (together with any statement) under Article 19  
pages 30-34, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the drawings:  
pages 1-11, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
pages NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

Form PCT/IPEA/409 (Box I) (July 1998)

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/01338

## IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.  
☐ paid additional fees.  
☐ paid additional fees under protest.  
☒ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention is accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.  
☒ not complied with for the following reasons:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group XIV, claims 136-155, drawn to a positive electrode comprising a positive foil substrate, a slurry coating comprising CFx.

Group XV, claims 156-159, drawn to a method of making an electrode comprising the steps of providing a foil substrate, forming a slurry comprising CFx and coating the slurry onto the foil substrate.

Group XVI, claims 160-163, drawn to a method of making an electrode comprising the steps of providing a foil substrate, forming a slurry comprising CFx, PTFE, carbon black and carboxy methylcellulose and coating the slurry onto the foil substrate.

Group XVII, claims 164-166, drawn to a method of making an electrode comprising the steps of providing a foil substrate and laminating lithium foil onto both faces of the substrate.

Group XVIII, claims 167-169, drawn to a method of making an electrode comprising the steps of providing a foil substrate, laminating lithium foil onto both faces of the substrate, providing a positive electrode and winding together the negative and positive electrodes.

The inventions listed as Groups XIV-XVIII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group XIV requires a slurry coating comprising CFx, which is not required by other groups. Group XV requires a slurry coating comprising CFx and a foil substrate, which is not required by other groups. Group XVI requires a slurry comprising CFx, PTFE, carbon black and carboxy methylcellulose, which is not required by other groups. Group XVII requires laminating lithium foil onto both faces of the negative foil, which is not required by other groups. Group XVIII requires the laminating lithium foil onto both faces of the negative foil and winding the negative and positive electrodes, which is not required by other groups.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.  
☒ the parts relating to claims Nos. 1-135

Form PCT/IPEA/409 (Box IV) (July 1998)

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/US03/01338**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>1-135</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>1-135</u>	YES
	Claims <u>NONE</u>	NO
Industrial Applicability (IA)	Claims <u>1-135</u>	YES
	Claims <u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Claims 1-9 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the use of a hollow elongate mandrel closely fitted around a electrically conductive elongate pin for mechanically reinforcing the pin.

Claims 10-27, 33-42 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest electrically connecting a first end of a first polarity electrode strip to an electrically conductive elongate pin and mounting a reinforcing mandrel to the pin.

Claims 28-32 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest an elongate reinforcing mandrel mounted on at least a portion of an electrically conductive elongate pin.

Claims 43-46 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a storage battery comprising an electrically conductive case sealed by first and second end caps, an electrically conductive terminal pin, a flexible conductive tab electrically coupled to a second electrode proximate a first location at the seal formed between the second end cap and the case as recited in the claim.

Claims 47-65 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a storage battery made by the steps of providing an electrically conductive terminal pin extending through a first end cap and electrically insulated from the case, forming a flexible conductive tab, and mounting the first end cap to seal the first wall opening and providing a second end cap of electrically conductive material as recited in the claim.

Claims 66-80, 96-108 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a storage battery comprising a case comprising a peripheral wall defining an interior volume and an exterior volume of less than 1 cm<sup>3</sup>.

Claims 81-95 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a storage battery comprising a case comprising a peripheral wall defining an interior volume and an exterior volume and having an external width of less than 3 mm.

Claims 109-135 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a storage battery comprising a case comprising a peripheral wall defining an interior volume and an exterior volume and having a thickness of less than 0.25 mm.

----- NEW CITATIONS -----

Form PCT/IPEA/409 (Box V) (July 1998)



File: Q137-PC1

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**PEAVUS**

121. The electric storage battery of any of claims 109 - 115 wherein said case has a diameter less than 3 mm.

122. The electric storage battery of any of claims 109 - 116 wherein said case is hermetically sealed.

5 123. The electric storage battery of any of claims 109 - 117 wherein said battery is a lithium or lithium ion battery.

124. The electric storage battery of any of claims 109 - 118 wherein said case comprises a titanium alloy.

10 125. The electric storage battery of any of claims 109 - 119 wherein said case comprises stainless steel.

126. A battery according to any of claims 1-18, 43-50, 55-57, and 60-120 wherein one of the electrodes comprises  $CF_x$ .

15 127. A battery according to claim 126 wherein the electrode comprising  $CF_x$  comprises:  
a positive foil substrate; and  
a slurry comprising said  $CF_x$  coated on both faces of said positive foil substrate.

128. A battery according to any of claims 1-18, 43-50, 55-57, and 60-127 wherein one of the electrodes comprises lithium foil.

20 129. A battery according to claim 128 wherein said lithium foil is laminated on a portion of both faces of a foil substrate.

130. A battery according to any of claims 1-18, 43-50, 55-57, and 60-129 wherein an outer layer of said electrode assembly comprises a separator.

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**AMENDED SHEET**

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131. An electrode assembly according to any of claims 28 - 33 wherein one of the electrodes comprises  $CF_x$ .

132. An electrode assembly according to claim 131 wherein the electrode comprising  $CF_x$  comprises:

- 5 a positive foil substrate; and  
a slurry comprising said  $CF_x$  coated on both faces of said positive foil substrate.

133. An electrode assembly according to any of claims 28 - 33 and 131 - 132 wherein one of the electrodes comprises lithium foil.

10 134. An electrode assembly according claim 133 wherein said lithium foil is laminated on a portion of both faces of a foil substrate.

135. An electric assembly according to any of claims 28-33 and 131 - 134 wherein an outer layer of said electrode assembly comprises a separator.

136. A positive electrode comprising:  
a positive foil substrate; and  
15 a slurry coated on both faces of said positive foil substrate, wherein said coating comprises  $CF_x$ .

137. The positive electrode of claim 136 wherein said positive foil substrate comprises aluminum.

20 138. An electrode assembly comprising:  
a negative electrode; and  
a positive electrode according to claim 136 or 137.

139. The assembly of claim 138 wherein said negative electrode comprises a negative active material on a negative foil substrate.

140. The assembly of claim 139 wherein said negative foil substrate comprises copper.

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**AMENDED SHEET**

File: Q137-PC1

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141. The assembly of any of claims 138 - 140 wherein said negative active material partially covers both faces of said negative foil substrate.

142. The assembly of any of claims 138 - 141 wherein said negative electrode comprises lithium.

5 143. The assembly of any of claims 138 - 142 wherein said positive and negative electrodes are wound to form a jellyroll.

144. The assembly of claim 143 further comprising an elongate pin around which said electrodes are wound.

145. The assembly of claim 144 wherein said elongate pin is electrically conductive.

10 146. The assembly of claim 144 wherein a portion of said pin forms a battery terminal.

147. The assembly of claim 144 wherein one of said electrodes is directly connected to said pin.

148. The assembly of claim 138 further comprising at least one separator separating said electrodes.

15 149. The assembly of claim 148 wherein an outer layer of said electrode assembly comprises said separator.

20 150. An electric storage battery including:  
a case comprising a peripheral wall defining an interior volume;  
an electrode assembly according to any of claims 138 to 149 mounted in said interior volume; and  
an electrolyte.

151. The battery of claim 150 wherein said case peripheral wall defines an exterior width of less than 3 mm.

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**AMENDED SHEET**

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152. The battery of claim 150 wherein said case has an exterior volume of less than 1 cm<sup>3</sup>.

153. The battery of claim 150 wherein said case has an exterior volume of less than 0.5 cm<sup>3</sup>.

154. The battery of any of claims 150 - 153 wherein said case is circularly cylindrical.

5 155. The battery of any of claims 150 - 154 wherein said case is hermetically sealed.

156. A method for making an electrode comprising the acts of:  
providing a foil substrate;  
forming a slurry comprising CF<sub>x</sub>; and  
coating the slurry onto both faces of the foil substrate.

10 157. The method of claim 156 wherein said act of providing a substrate comprises providing an aluminum foil substrate.

158. The method of claim 156 wherein said act of forming a slurry comprises mixing CF<sub>x</sub>, polytetrafluoroethylene, carbon black, and carboxy methylcellulose.

15 159. The method of claim 156, further comprising the act of compressing the coated foil substrate.

20 160. A method for making an electrode comprising the acts of:  
providing a foil substrate;  
forming a slurry comprising CF<sub>x</sub>, polytetrafluoroethylene, carbon black, and carboxy methylcellulose; and  
coating said slurry onto the foil substrate.

161. The method of claim 156 wherein said act of providing a foil substrate comprises providing an aluminum foil substrate.

162. The method of claim 156 wherein said act of coating the slurry onto the foil substrate comprises coating the slurry onto both faces of the foil substrate.

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(replacement July 9, 2003)

AMENDED SHEET

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163. The method of claim 156, further comprising the act of compressing the coated foil substrate.

- 5 164. A method for making an electrode comprising the acts of:  
providing a negative foil substrate; and  
laminating lithium foil onto both faces of the negative foil substrate, leaving a portion of the negative foil substrate free of lithium.

165. The method of claim 164 wherein said act of providing a negative substrate comprises providing a copper foil substrate.

166. The method of claim 164 or 165 wherein the total electrode thickness is about 65  $\mu\text{m}$ .

- 10 167. A method for making an electrode assembly comprising the acts of:  
forming a negative electrode comprising the acts of:  
providing a negative foil substrate; and  
laminating lithium foil onto both faces of the negative foil substrate, leaving a  
portion of the negative foil substrate free of lithium;  
15 providing a positive electrode; and  
winding together the negative and positive electrodes to form a spiral roll.

168. The method of claim 167 wherein said act of providing a negative foil substrate comprises providing a copper foil substrate.

- 20 169. The method of claim 167 or 168 wherein the total negative electrode thickness is about 65  $\mu\text{m}$ .

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(replacement July 9, 2003)

AMENDED SHEET